Landsat Thematic Mapper Data Used To Map Trends In The Louisiana Coastal Wetland And Adjacent Upland Landscapes; Improving Accuracy And Interpretation Of Change.

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ABSTRACT

Dramatic losses of wetlands within coastal Louisiana have been documented. To mitigate the losses where feasible and manage the remaining resources in a sustainable fashion a regional assessment is necessary of the present land cover, recent land cover change, and the association between wetland condition and human-induced (e.g., hydrologic modification, non point source pollution) and natural (e.g., sea level rise, storms) forces. Our objective is to develop and build a comprehensive and standardized geographic information system to detect and assess long-term and rapid changes in land cover and habitat in coastal wetlands and adjacent agriculture and forested uplands. This would benefit development of the Louisiana coastal nonpoint source program (NPS) mandated by the Coastal Zone Management Act Reauthorization Amendments of 1990. Its objective is to reduce NPS pollution in surface and ground waters and adjacent coastal waters. Statewide, about 30% of the NPS pollutants can be attributed to agriculture and about 35% of wetlands are impacted by agriculture NPS pollutants.

To attain our objective, Landsat Thematic Mapper images from 1990, 1993, 1996, and 1999 and collateral data sources were used to classify the adjacent uplands and coastal wetlands covering about half the Louisiana coastline. Landcover classes followed the definition of the National Oceanic and Atmospheric Administration's Coastal Change Analysis Program (C-CAP); however, classification methods had to be modified or developed to attain C-CAP classification standards. Classification method developments were especially important when classes were spectrally inseparable, when classes were part of spatial and spectral continuums, when the spatial resolution of the sensor included more than one landcover type, and when human activities caused abnormal transitions in the landscape. Most classification problems were overcome by using a combination of techniques, such as separating the coastal region into subregions of commonality, applying masks to specific land mixtures, highlighting class transitions between years that were highly unlikely, and identifying change with spectral extremes.

To allow quick assessment and reporting of the dynamic nature of landcover classes, both in reference to a spatial location and to retaining their presence throughout the study area and to improve the interpretation of landcover change, three indicators of landcover class stability were formulated. *Location stability* was defined as the percentage of a landcover class that remained as the same class in the same location at the beginning and the end of the monitoring period. *Residence stability* was defined as the percent change in each class within the entire study area during the monitoring period. *Turnover* was defined as the addition of other landcover classes to the target landcover class during the defined monitoring period.